

Indo-US Conference, New Delhi
17-18th April 2002

Coal Bed Methane and Gas Hydrate Development Programme in India

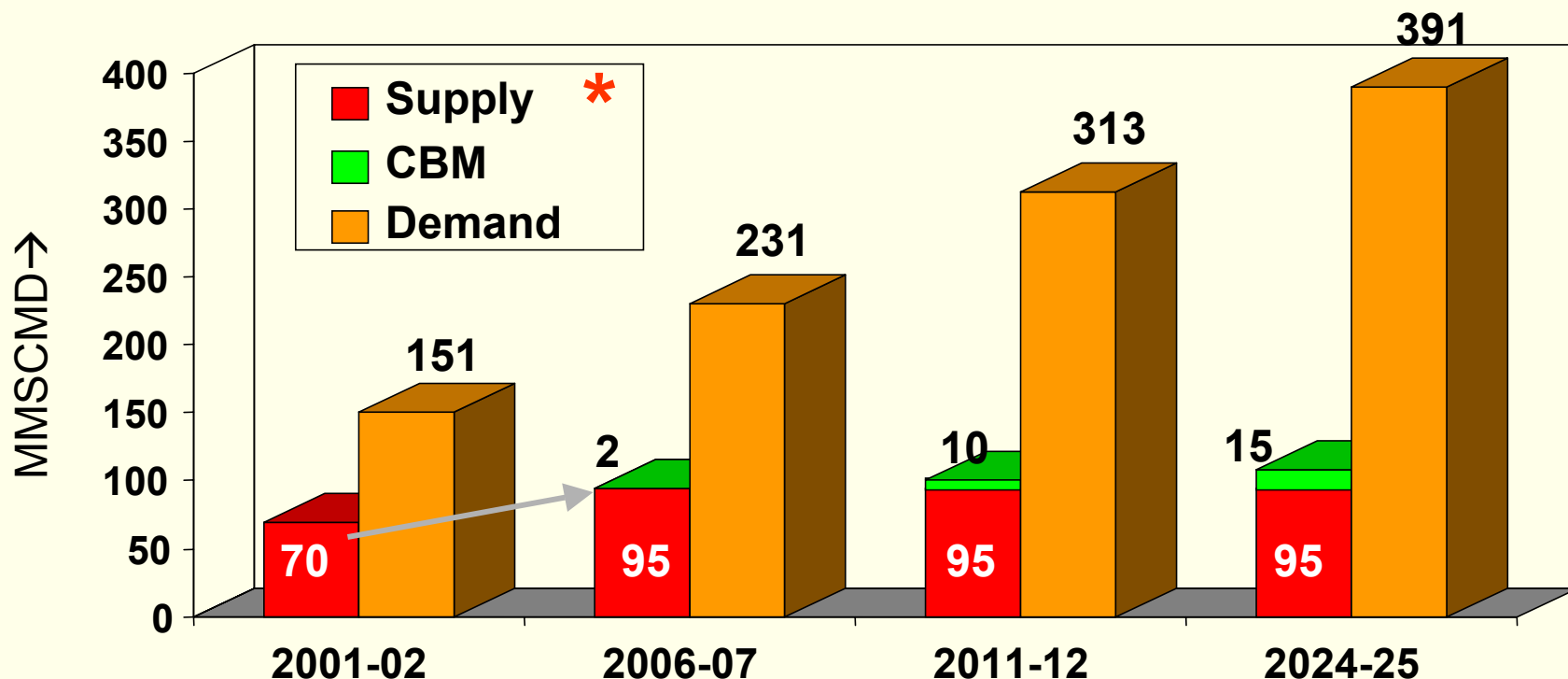
By
Dr. Avinash Chandra
Director General
Directorate General of Hydrocarbons

DGH

Coal Bed Methane Prospects and Development in India



Natural Gas Demand Supply Projections



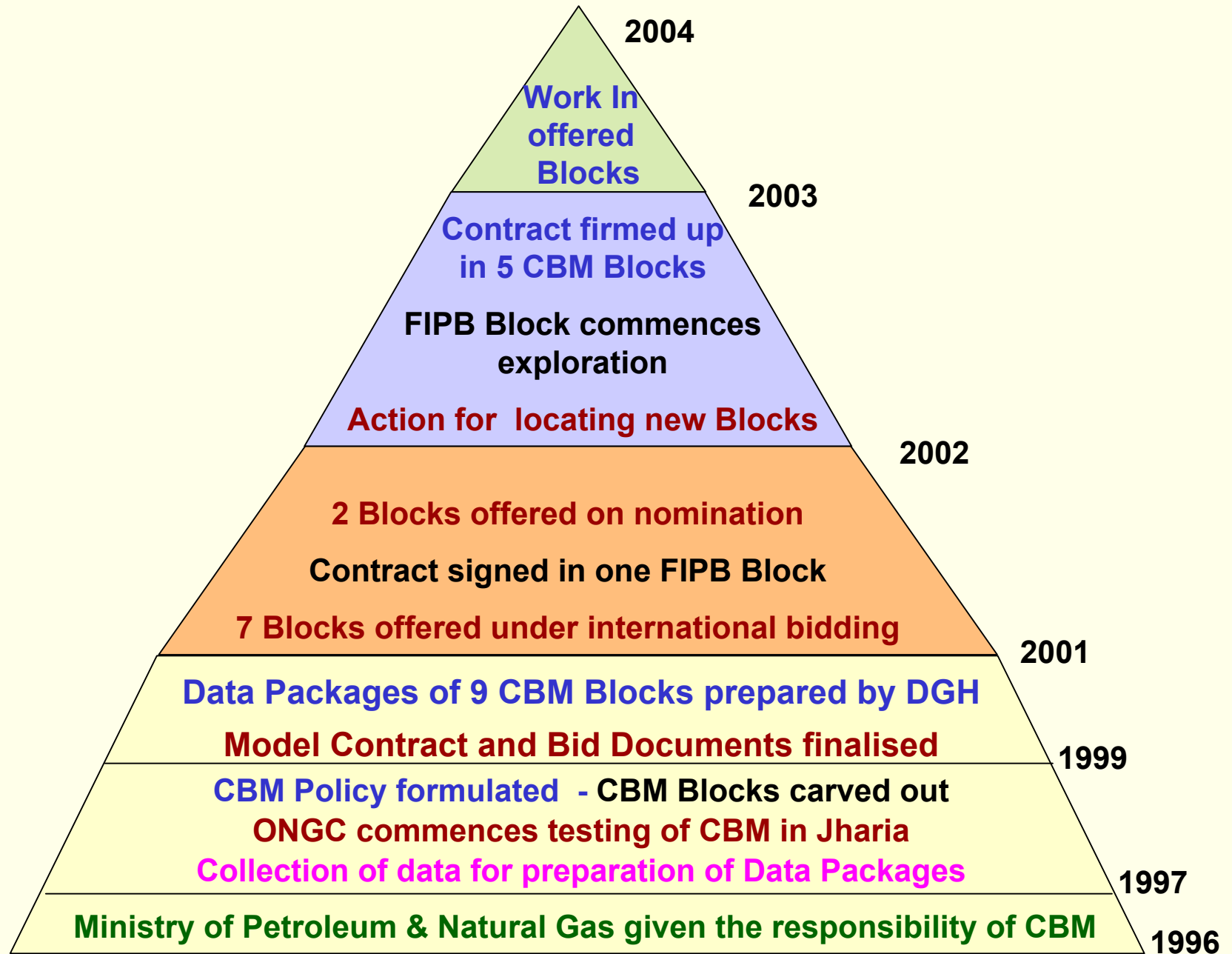
* Supply projections on present reserves of conventional gas

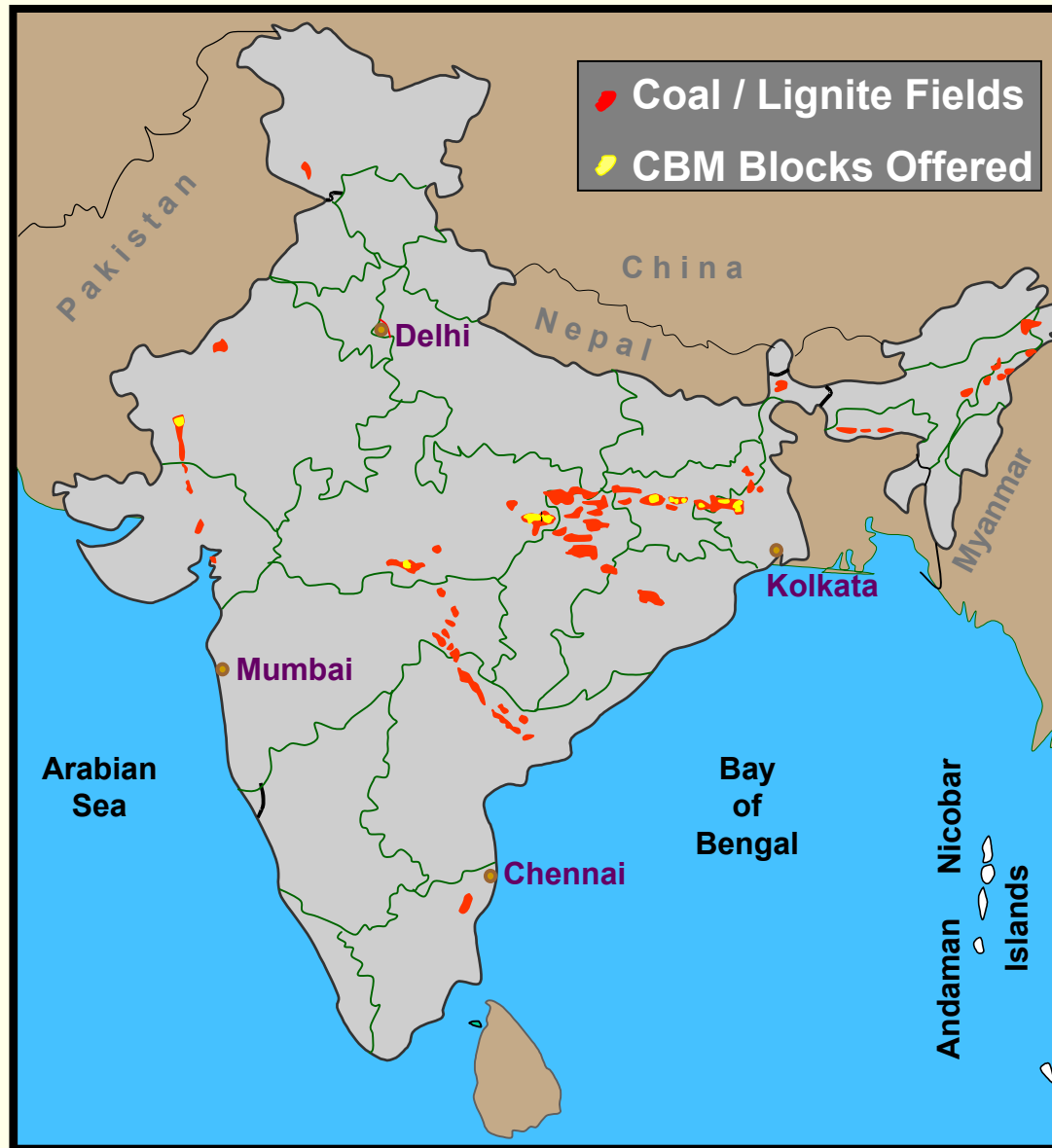
→ 30% increase due to recent discoveries in Pvt./J.V. Sector



GROWING NEED OF COAL BED METHANE EXPLOITATION IN INDIA

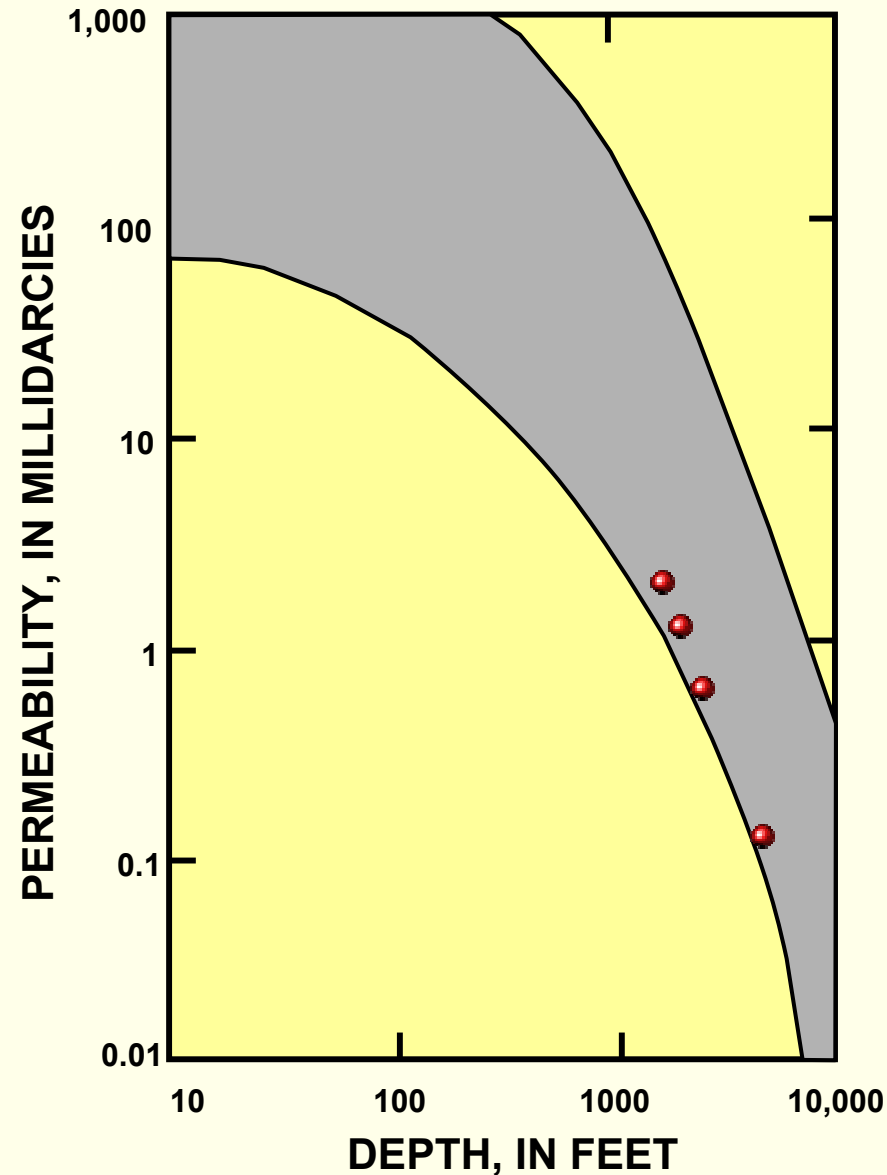
- ◆ **CBM AN ENVIRONMENT FRIENDLY CLEAN FUEL**
- ◆ **ENERGY BENEFIT OF WASTE MATERIAL**
- ◆ **REDUCTION OF EMISSION OF GREENHOUSE GAS**
- ◆ **DEGASSIFICATION REDUCES MINING RISKS**
- ◆ **CBM USE IN POWER STATIONS AND OTHER INDUSTRIES**





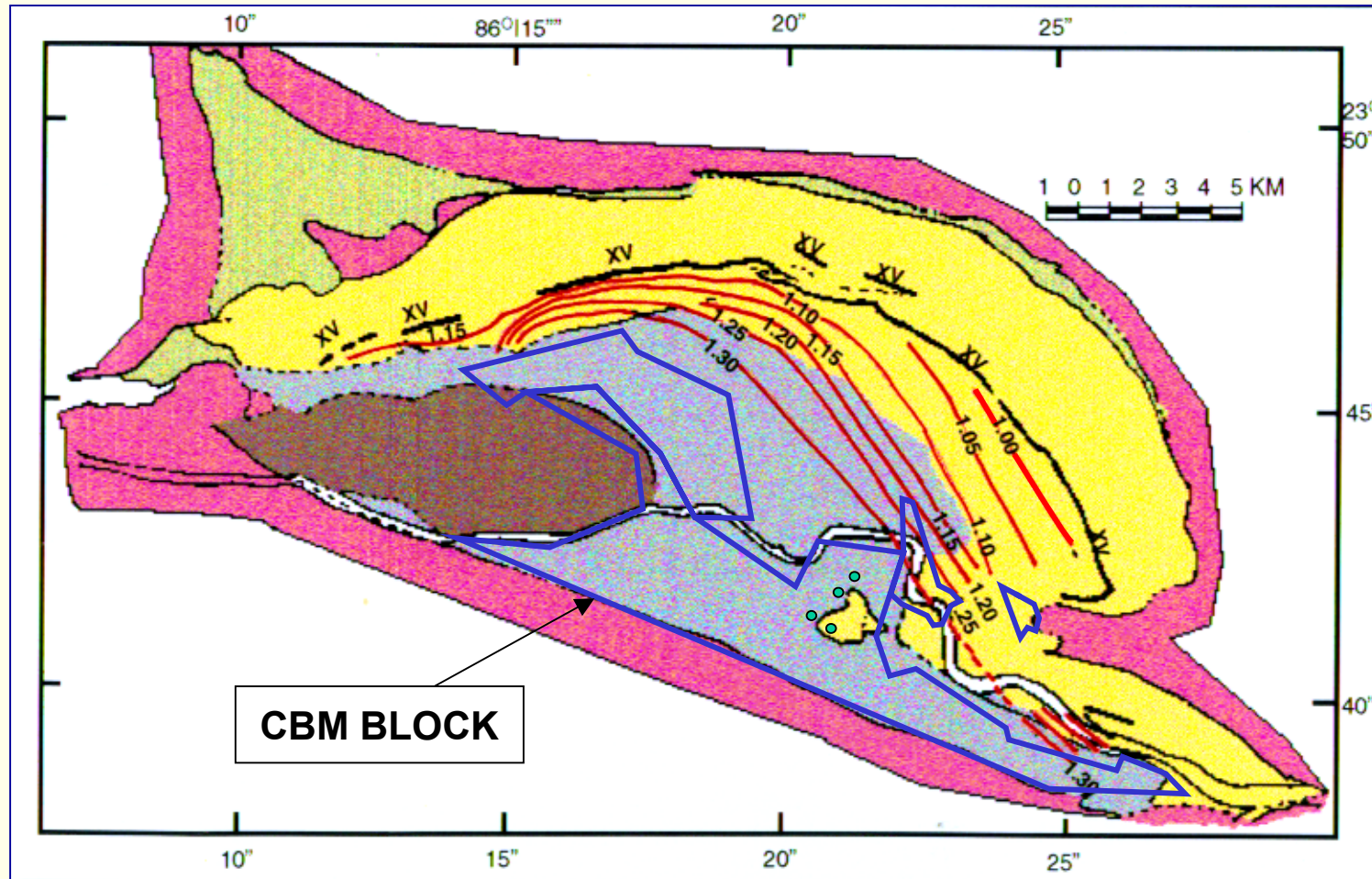


PERMEABILITY OF SOME TESTED GONDWANA COAL SEAMS SHOWN ON PERMEABILITY VERSUS DEPTH PLOT OF COAL BEDS OF USA



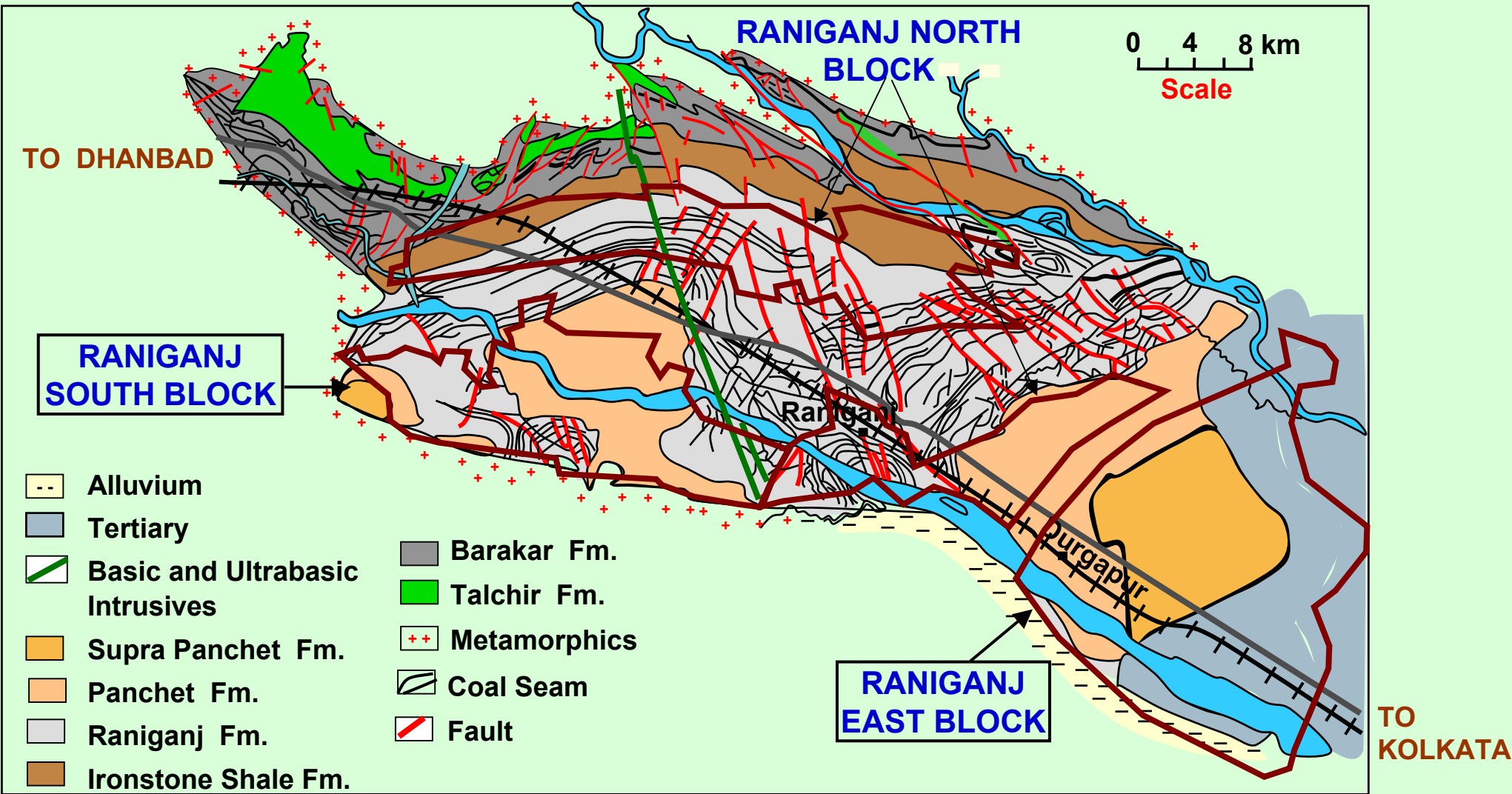
- ◆ Heterogeneous Indian coal – a complex reservoir
- ◆ Permeability moderate
- ◆ Low permeability compensated by large thickness ($k \times h$)
- ◆ Coal under subhydrostatic pressure upto 300m depth.
- ◆ Jharia test well yields 8000 m³/d of gas flow
- ◆ Water production low
- ◆ Blocks hold promise of 2-3 MMSCMD gas production

CBM BLOCK IN HIGH RANK COALZONE IN JHARIA COALFIELD

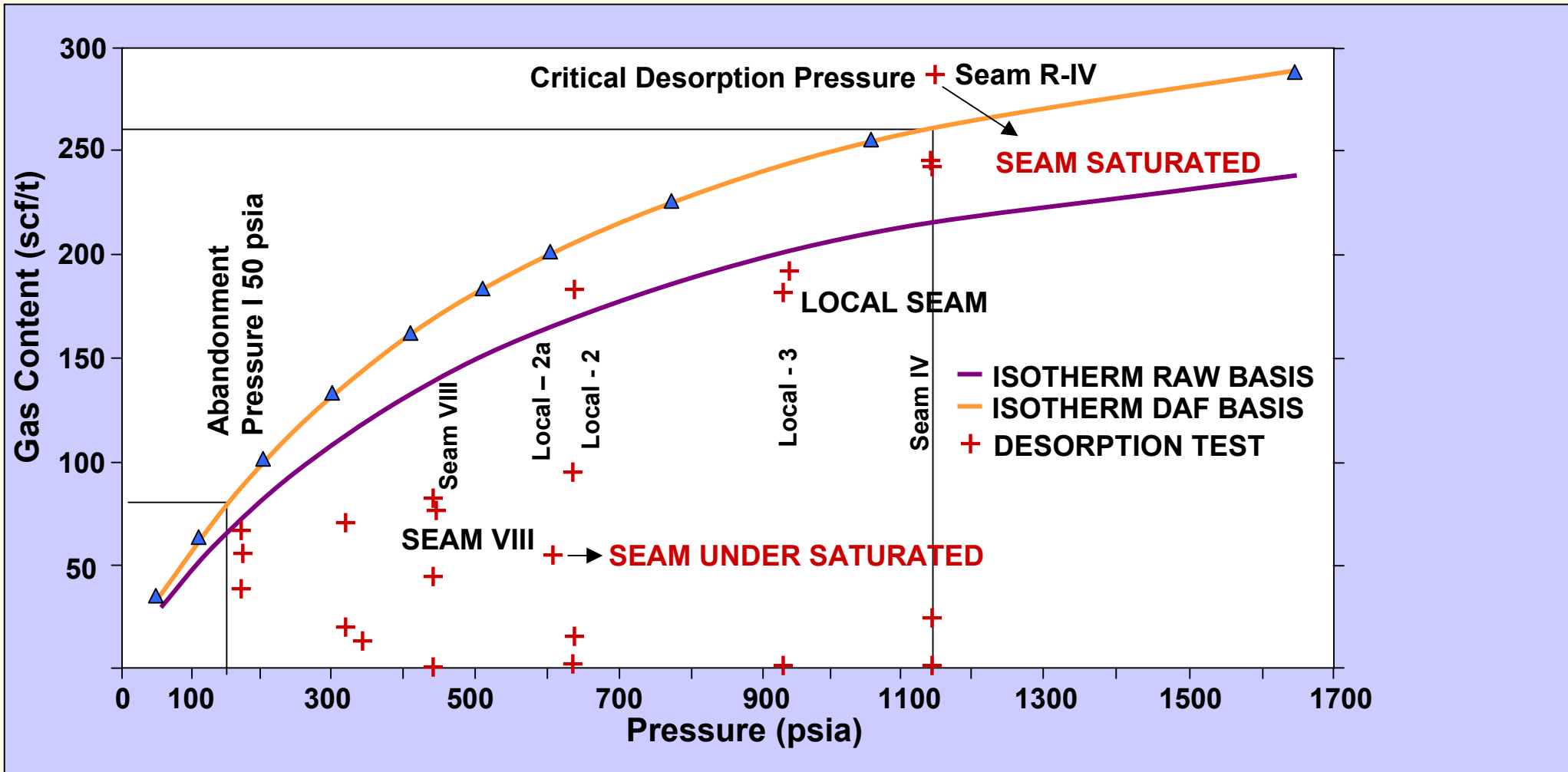


- ◆ **COAL SEAMS** : 18 Regional Seams
- ◆ **THICKNESS** : 1 – 33 m
- ◆ **DEPTH** : 300 – 1200 m
- ◆ **GAS CONTENT** : Usually 6 – 16 m³/t
- ◆ **PERMEABILITY** : 0.03 (Deeper Seam) to 3.0 md (Upper Seam)
- ◆ **GAS PRODUCTION** : 8000 m³/d or 300,000 ft³/d in test well
- ◆ **WATER PRODUCTION** : 2 – 5 m³/d
- ◆ **R&D ACTIVITY** : UNDP Project in another part of this field

GEOLOGICAL MAP OF RANIGANJ COALFIELD SHOWING OFFERED CBM BLOCKS



ADSORPTION ISOTHERM TEST OF COAL SEAMS IN SOUTH WESTERN PART OF RANIGANJ COALFIELD



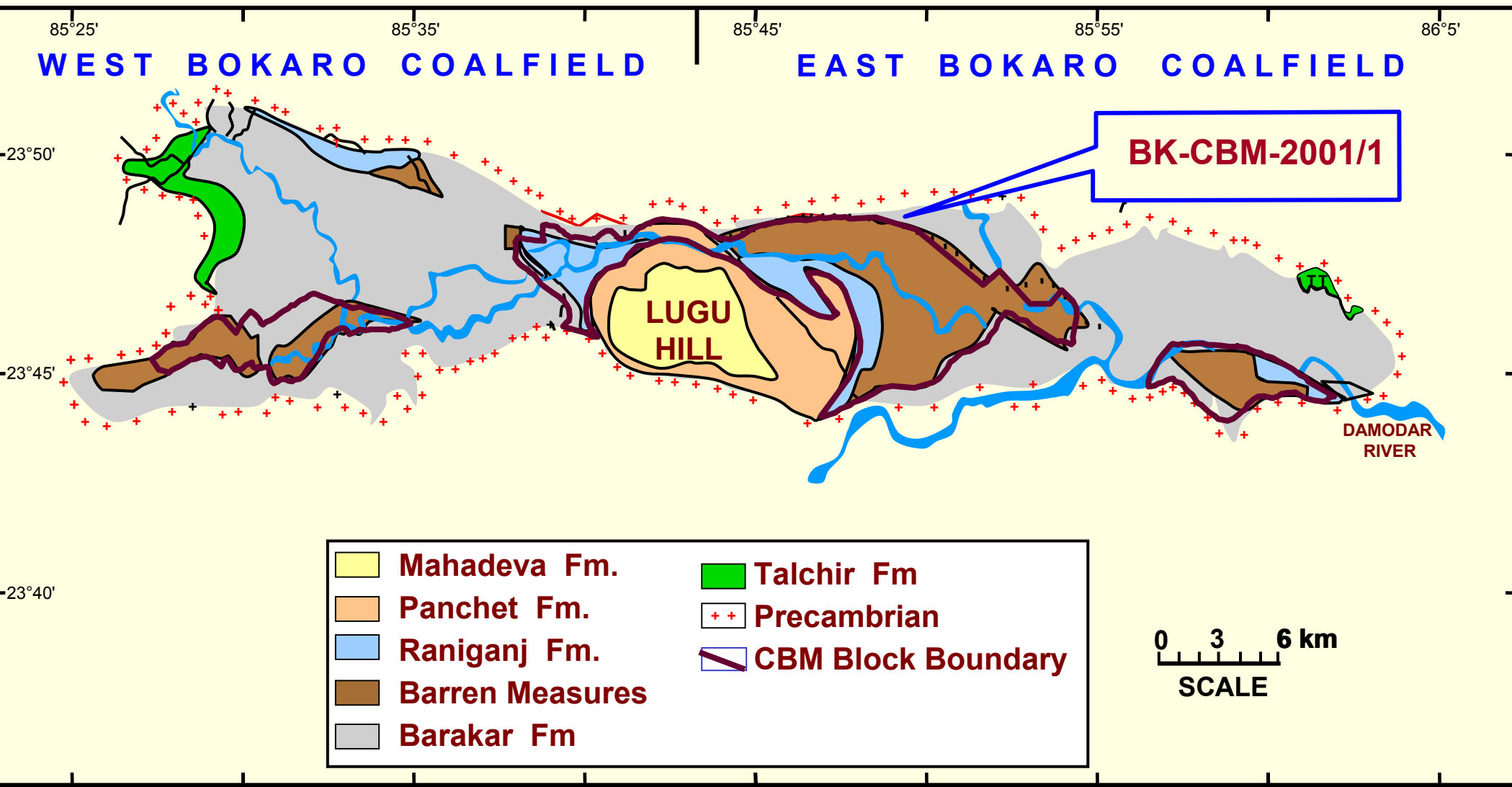


RANIGANJ COALFIELD IN THRESHOLD OF CBM DEVELOPMENT

- ◆ **THREE CBM BLOCKS :** East Raniganj (500 Sq.Km.)
North Raniganj (350 Sq.Km.)
South Raniganj (210 Sq.Km.)
- ◆ **SEAM THICKNESS :** 4 – 46 m
- ◆ **GAS CONTENT :** 2 – 17 m³/t
- ◆ **PERMEABILITY :** Good upto 800m depth
- ◆ **ANTICIPATED GAS PRODUCTION :** 2 – 3 MMSCMD



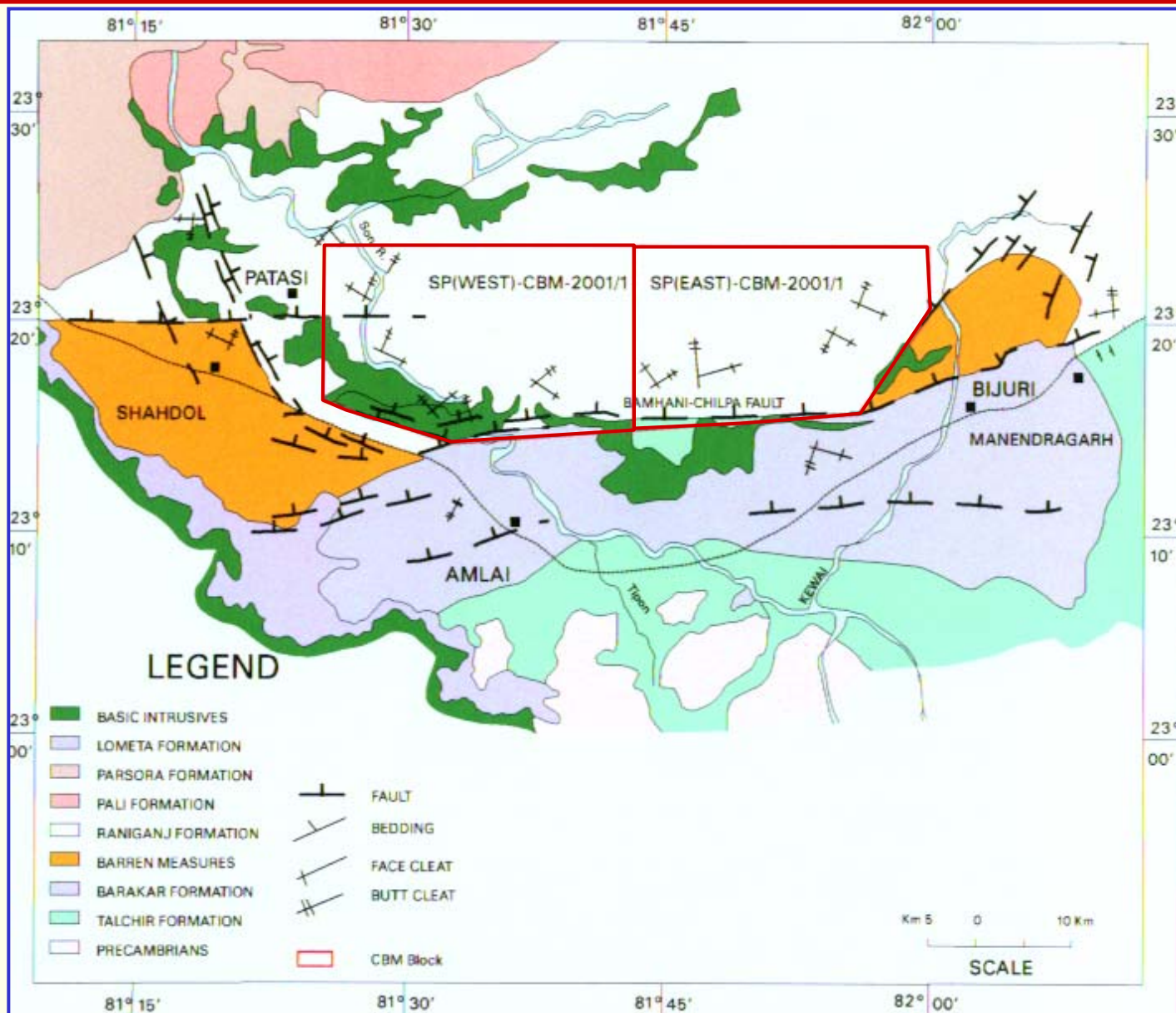
GEOLOGICAL MAP OF BOKARO COALFIELD



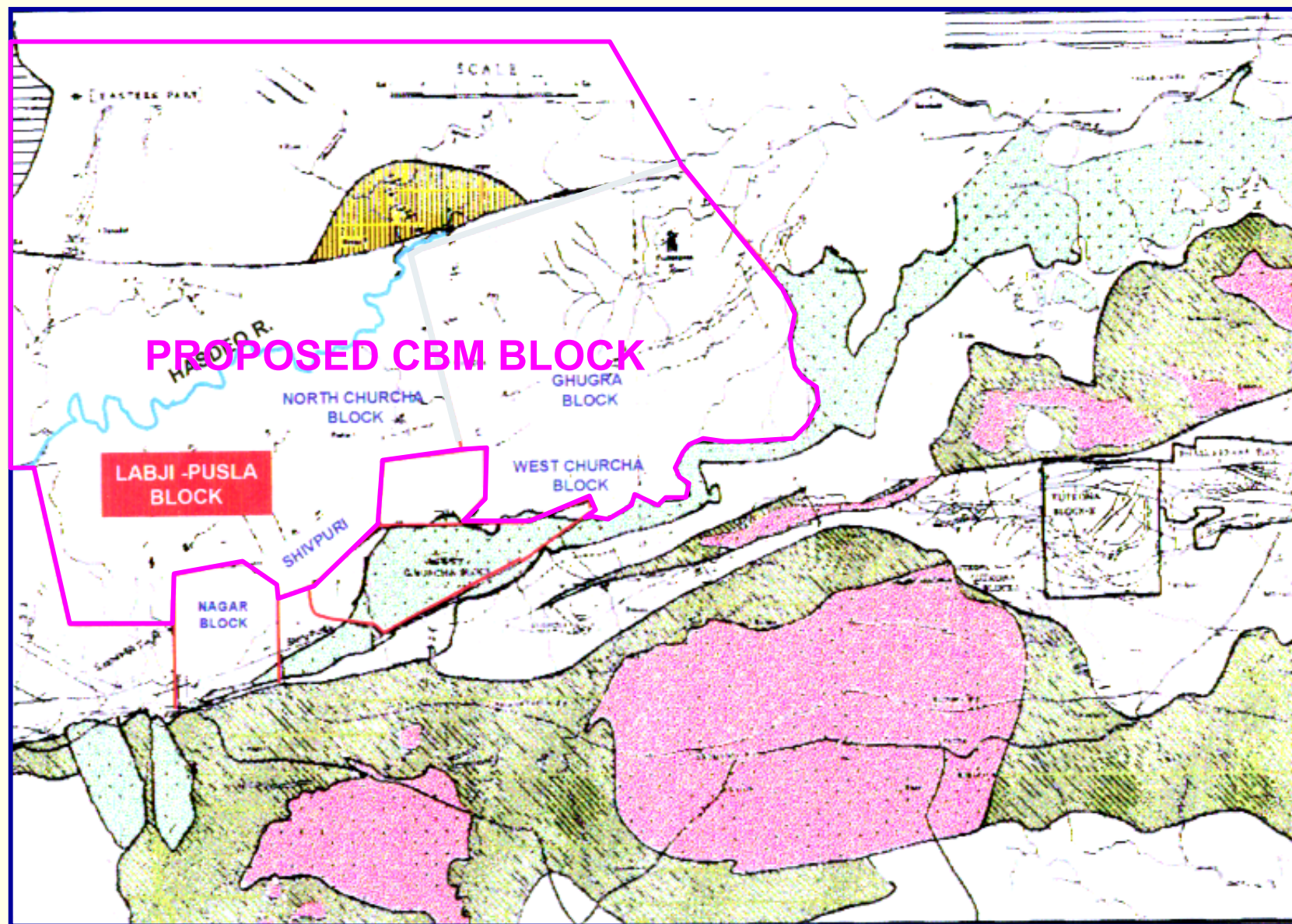
BOKARO COALFIELD : A SMALL YET AN EXCELLENT CBM PROSPECT

- ◆ **COAL SEAMS** : 22 Nos.
- ◆ **THICKNESS OF SEAMS** : 2 – 36 m
- ◆ **DEPTH** : 300 – 1500 m
- ◆ **GAS CONTENT** : 6 – 12 m³/t
- ◆ **HYDROGEOLOGY** : Sub artesian at places
- ◆ **PERMEABILITY** : Continuous gas emission from old boreholes shows good permeability
- ◆ **ANTICIPATED PRODUCTION** : 2 MMSCMD

GEOLOGICAL MAP OF SOHAGPUR COALFIELD

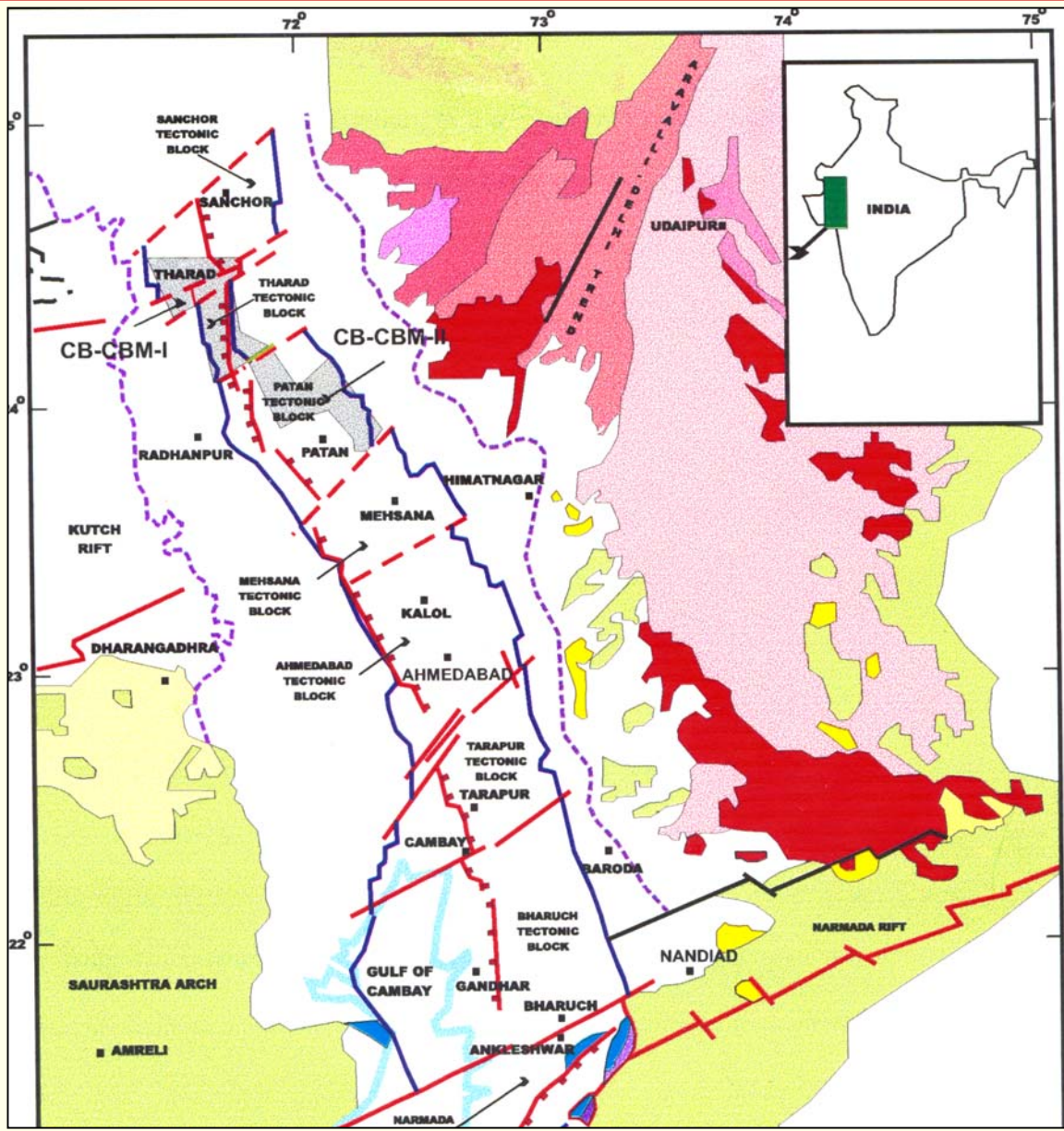


PROSPECTIVE CBM BLOCK IN SONHAT COALFIELD, CHHATTISGARH



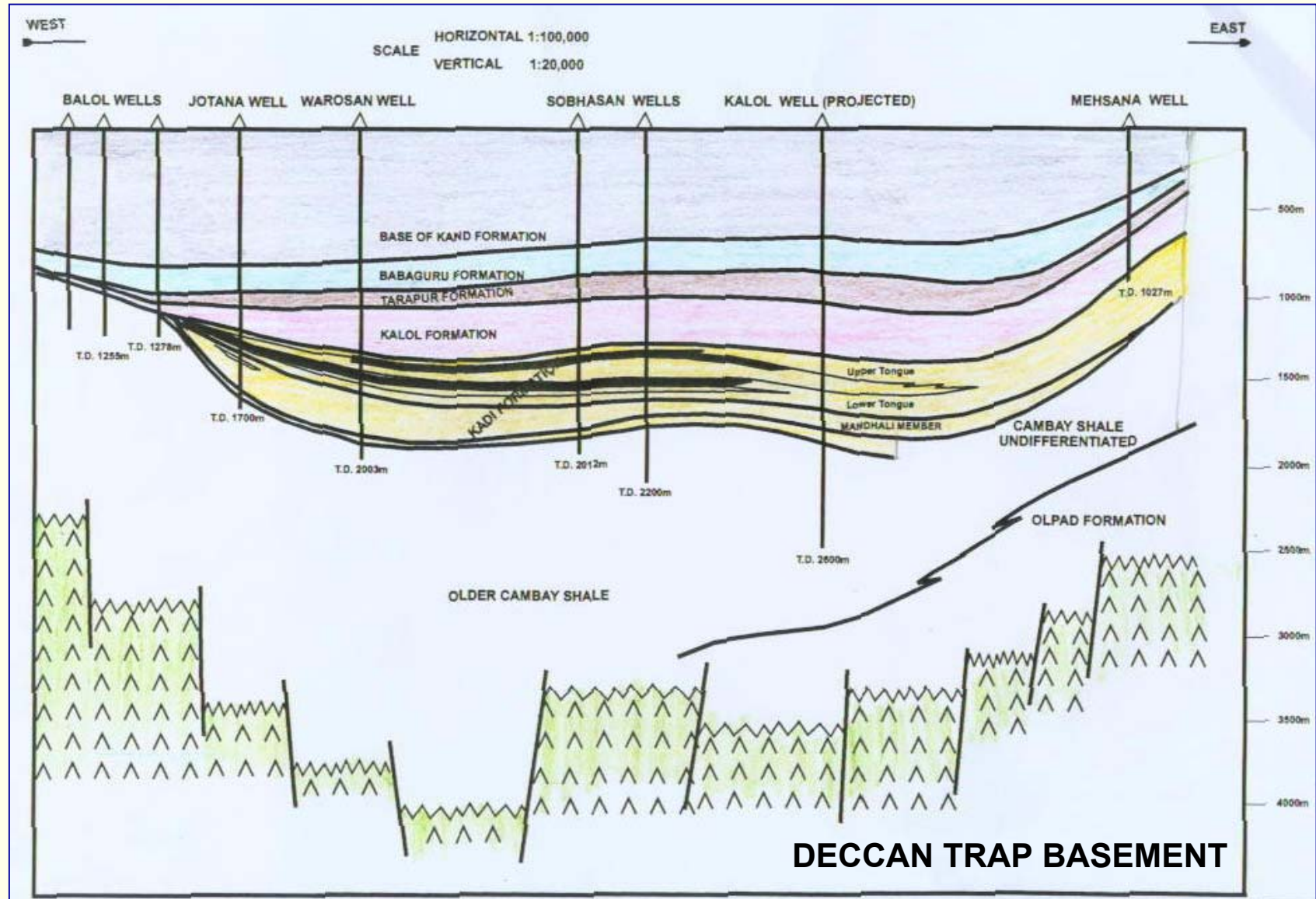
- ◆ Local development of high rank coal in regional low rank coal domain
- ◆ Coal Seam : 5 – 6 Nos.
- ◆ Thickness : 1 – 12 m
- ◆ Gas content : 3 – 10 m³/t
- ◆ Production prospect : Good as large command area available for CBM exploitation

SCHEMATIC MAP OF PROPOSED CBM BLOCKS, CAMBAY BASIN

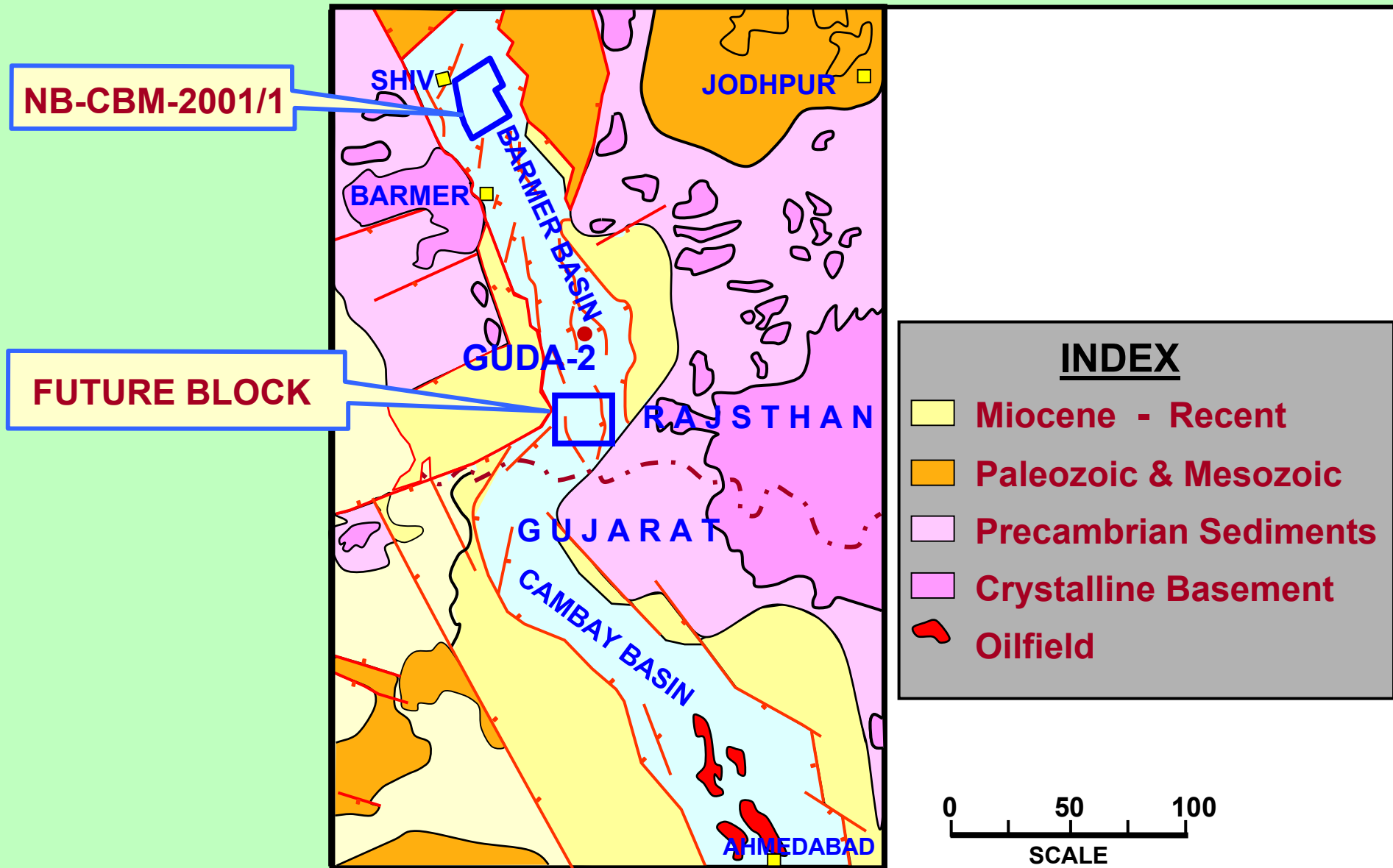


1. ALLUVIUM
2. NEOGENE
3. PALAEOGENE
4. DECCAN TRAP
5. UPPER CRETACEOUS
6. LOWER CRETACEOUS
7. ERINPURA GRANITE
8. DELHI SUPER GROUP
9. ARAVALI SUPER GROUP
10. ARCHAEN
11. PRECAMBRIAN TREND
12. PLAEOGENERIFT MARGIN
13. NEOGENE MARGIN
14. PREMORDIAL FAULTS
15. MAJOR TRANSFER FAULTS
16. COAST LINE

SECTION SHOWING DEVELOPMENT OF THICK LIGNITE SEAMS IN SOBHASAN AREA, CAMBAY BASIN, GUJARAT



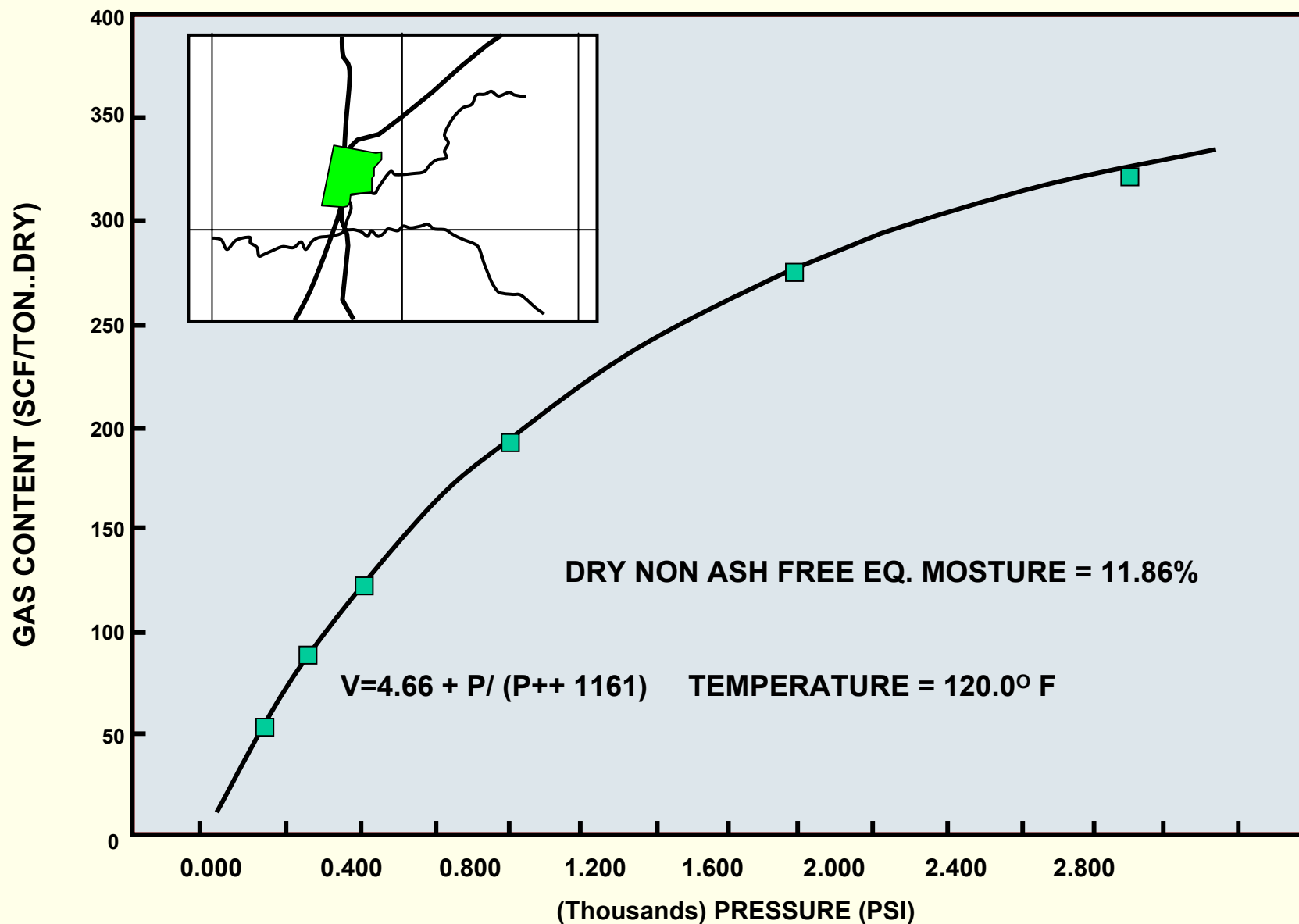
- ◆ **BLOCK AREA** : 2220 Sq.Km.
- ◆ **LIGNITE THICKNESS** : 10 - 23 m
- ◆ **DEPTH** : 900 – 1400 m
- ◆ **GAS CONTENT** : 3 – 5 m³/t
- ◆ **PERMEABILITY** : 1 – 3 md



LITHOLOGICAL SEQUENCE INTERSECTED IN GUDA-1 WELL

AGE	FORMATION	LITHOLOGY	DEPTH (M)
RECENT	Alluvium	Gravel, sand & Clays	
MIOCENE- PLIOCENE	KALIANA	Gravels, Channel sands, Clays	162m
	JAGADIA	Sands, Silts & Clays	385m
	KAND	Clays, Sands	650m
	BABAGURU	Channel sands, Clays, Gravels	852m
		unconformity	1079m
Oligo	WAY	Marl, Shale & Lignite	1105m
MIDDLE EOCENE	UPP. THARAD	Sandy shale & Silt	1319m
		unconformity	1374m
	MID. THARAD	Lignite, Silty Clays	
		Shales, sandy & silty at top, Lignite & Carb. Shale.	1817m
	LR THARAD	Lignite, Clay & Silty Sands	

ADSORPTION ISOTHERM OF LIGNITE SEAMS, GUDA WELL-1, BARMER BASIN, RAJASTHAN





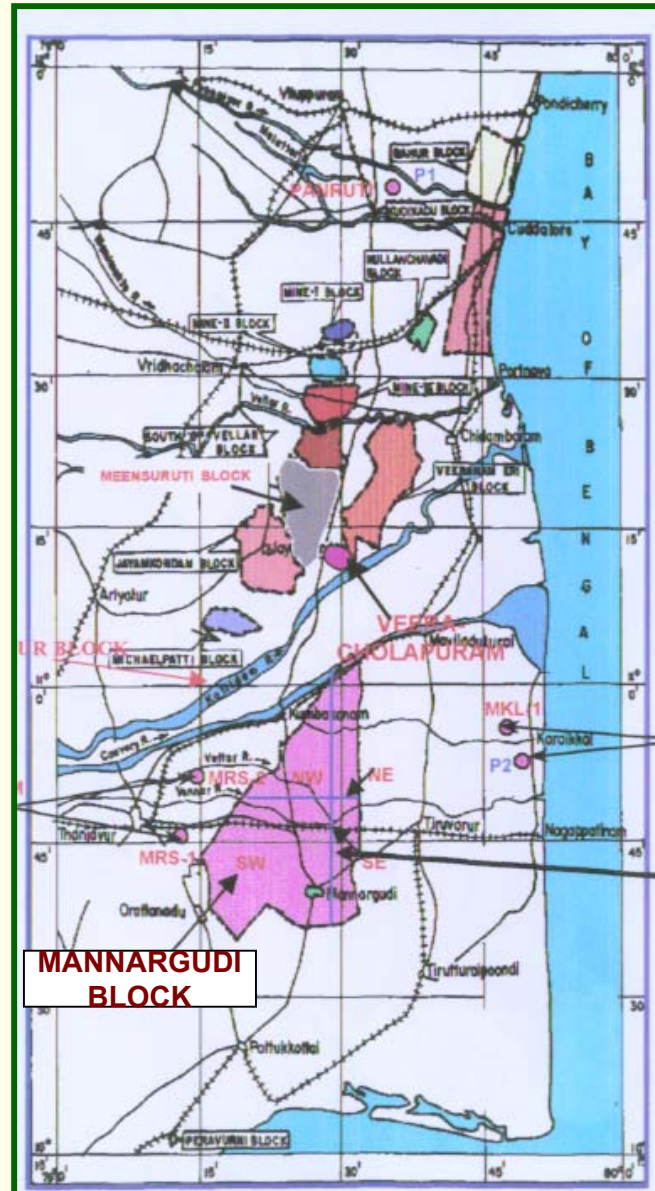
CBM PROSPECT IN BARMER BASIN, RAJASTHAN

◆ North Block offered earlier

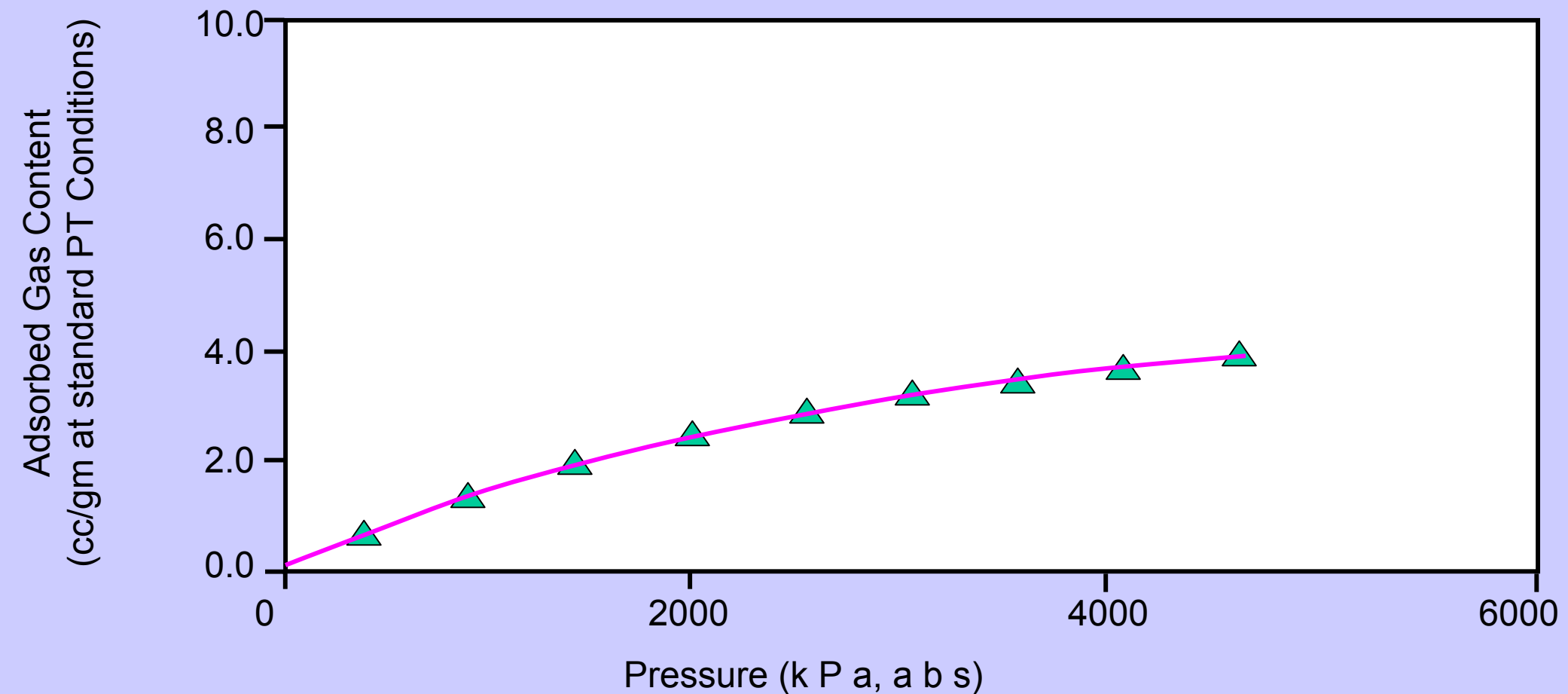
◆ South Block

- Area : 1111 Sq. Km.
- Lignite : 40 - 60 m
- Depth : 500 - 1500 m
- Gas Content : 3- 5 m³/t. Adsorption isotherm
: 7.2 m³/t at 41.5 kg/Cm²

LOCATION MAP OF LIGNITE FIELDS IN TAMILNADU



ADSORPTION ISOTHERM OF MANNARGUDI LIGNITE FROM BOREHOLE AT 472.3 m DEPTH



- ◆ **TOTAL PROSPECTIVE AREA** : 500 Sq. Km.
- ◆ **LIGNITE THICKNESS** : 10-90 m
- ◆ **LIGNITE DEPTH** : 200-500 m
- ◆ **LIGNITE RESERVES** : 20 Billion Tonnes
- ◆ **GAS CONTENT**
 - **SORPTION CAPACITY (MAX.)** : 3.9-4.3 m³/t
 - **DESORPTION TEST** : 0.87 m³/t
- ◆ **ANALOGY WITH POWDER RIVER BASIN**

WORK PROGRAMME IN 5 OFFERED CBM BLOCKS AND PRODUCTION POSSIBILITY

S.No.	CBM Block	Duration of Exploration Phase	No. of Wells to be drilled	Estimated Expenditure In Crores	DGH Projection of Peak Production in Exploitation Stage in MMSCMD
1	RANIGANJ EAST RG(EAST)-CBM-2001/1	Phase I – 2 years Phase-II – 3 years	87	21.02	1.5
2	BOKARO BK-CBM-2001/1	Phase I – 2 years Phase II – 4 years	20	14.58	1.9
3	NORTH KARANPURA NK-CBM-2001/1	Phase I – 2.5 years Phase II – 4 years	15	7.97	2.0
4	SOHAGPUR (EAST) SP(EAST)-CBM-2001/1	Phase I – 2 years Phase II – 1.5 years	18	6.20	1.8
5	SOHAGPUR (WEST) SP(WEST)-CBM-2001/1	Phase I – 2 years Phase II – 1.5 years	18	6.24	1.8
					9.0

Thank you